

**Remarks by the Honorable Frederick Gregory
NASA Deputy Administrator
Engineering and Construction
Contracting Association
Orlando, Florida
September 8, 2005**

Thank you Dwayne (Dwayne Wilson, Fluor/Daniel Corp., Chair of Conference) for that generous introduction and good morning ladies and gentlemen. **(SLIDE ONE: TITLE)**

I am honored that you have asked me to keynote this conference on Shaping the Future of the Capital Projects Business.

My goal today is to engage your thinking and conversation about common issues facing our distinct communities.

Among them are the long-term challenges we face in building our future workforce, and our mutual need to develop innovative new designs and engineering strategies to successfully manage bold projects now on the drawing boards.

But first, as we have learned from Hurricane Katrina and its aftermath, sometimes the shocks we envision do not lie ahead in the far future.

Sometimes they can come in a matter of hours and days with the gusts of the most elemental forms of nature, and damage our people and economy in ways beyond imagining.

For those of you who have personally experienced the devastation of Hurricane Katrina, my heart goes out to you.

Throughout my career as a helicopter and fixed wing pilot, I've flown in some pretty rough weather.

I've learned to respect nature's fury and the task many of you have ahead in helping to rebuild the damaged offshore oil rigs, and the refineries and large structures hit in coastal Alabama, Mississippi and Louisiana.

As an astronaut, I've also had the unique experience of viewing powerful weather forces at work from the vantage point of space.

During my 1991 Shuttle mission onboard the orbiter *Atlantis*, my crewmates and I watched the formation of Super Typhoon Yuri, a tropical cyclone that came very close to devastating the island of Guam.

(SLIDE 2: TYPHOON)

Here's a picture I took of Yuri, which shows the immensity of a typhoon's structure. It is literally 45,000 feet from the top of the storm to the sea surface, a height well-above the maximum altitude of a typical airliner.

Yuri packed maximum sustained winds of 165 miles per hour, with gusts extending to 200 miles per hour.

Of course it is one thing to see a storm of this magnitude from a safe distance 200 miles overhead and another to live through such a monster.

As Katrina hit the gulf coast, many of my NASA colleagues at our Stennis Space Center in southern Mississippi and Michoud Shuttle External Tank Assembly Facility in New Orleans bore the brunt of the storm.

Indeed, 4,000 NASA employees, contractors, family members and local residents sought shelter from the storm in the Stennis Space Center, one of the few facilities in the area that avoided major damage. The Federal Emergency Management Agency also used Stennis as a staging area for recovery operations.

The entire region now faces a phenomenal recovery task.

But as horrible as this natural disaster is, imagine how much greater the loss of life would be if we didn't have accurate advance warning of the hurricane's path.

One of the untold stories of this story of the year is how helpful satellite imagery provided by NASA and our friends at NOAA was in alerting officials to the danger posed by Katrina in time to initiate the evacuation process.

This imagery comes from a number of research and weather satellites that provide us with significantly greater predictive power about the path and magnitude of major storm events.

Indeed, as a result of NASA's development and deployment in the past decade of the Tropical Rainfall Measuring Mission and Aqua satellites and the Quikscat sea winds measurement instrument, we are now able to predict the formation of tropical storms nine days out instead of seven days, and predict landfall within a 400 mile area instead of 800.

(SLIDE 3: EXTENT OF HURRICANE KATRINA)

Let me show you a couple images from Hurricane Katrina. The first is from the MODIS instrument on NASA's Terra Satellite.

You can see above the huge expansion of Lake Pontchartrain the day after the storm, leading to the breaching of the levees near downtown New Orleans. You can also see in the image how Lake Pontchartrain and Lake Maurepas joined up. The bottom image is of the area prior to the hurricane's landfall.

(SLIDE 4: DEPTH OF HURRICANE KATRINA)

The second image, derived from data from our Tropical Rainfall Measuring Mission, or TRMM satellite, and the GOES spacecraft, gives us a better picture of the dimensions of the hurricane. Those areas in red were generating two inches of rainfall per hour.

As the President said, because of the enormous magnitude of this natural disaster, the recovery may take a matter of years, not just months. Your industry will be relied upon to do much of the recovery work. Looking at the determination in your faces, I'm confident you will be up to the challenge.

But to be sure, this will be no simple task. The challenge of rebuilding New Orleans and the Gulf Coast area is a very complicated one with huge issues involving capital, logistics and human resources.

I would submit, though, that even under normal circumstances in the future, your community would face fairly significant challenges of this nature.

Thus, the intended purpose of this conference has even greater relevance that you might have imagined a few weeks ago.

I might add that NASA faces these challenges as well as we ponder how to implement our long term exploration agenda.

Let me introduce, for example, one mutually complicating factor in the management of our human resources.

With one-fourth of NASA scientific and engineering workforce facing retirement within the next five years, we are literally facing a work force crisis. These are the folks not only responsible for some incredible scientific and exploration achievements, but also hold in their minds tremendous institutional knowledge.

We will try to capture this institutional memory as best we can as we train a new generation to run the space program, but we know this will be an imperfect process. Many of you can say the same thing about your organizations.

But first, we have to attract that new generation. While technical employment opportunities are expected to increase at a rate almost four times greater than for all other occupations throughout this decade, it is an alarming fact that enrollment in science and engineering college courses has been in decline.

This trend has broader national implications as well. A report by the National Science Board says the nation is losing "a long-distance race" to maintain its edge in human scientific resources.

The Board pointed out that the U.S. ranks 17th among nations surveyed in the share of 18 to 24 year-olds who earn natural science and engineering degrees, trailing Taiwan, South Korea, Italy and Ireland.

So as much as we are currently focused on the immediate problems of our time, we at NASA are convinced a regeneration of our nation's commitment to the bold spirit of exploration and discovery will help reverse this trend. Even in times of despair and uncertainty, we must look forward.

And the space program is the most forward looking agency of government that exists.

We know from the Apollo program that NASA's ability to inspire that next generation to study math and science and consider technical careers can have a great impact on developing our nation's overall scientific and engineering talent pool.

Accordingly, as we move ahead with initial activities to implement our long-term exploration strategy to explore the moon, Mars and beyond, we're putting a lot of effort in reaching out to our next generation of explorers, with projects like NASA's Explorer Schools, a commitment of the agency to bring the excitement of our missions and science activities into demographically diverse schools throughout the country.

Thus, in reaching for the stars, we hope to sow seeds of hope and inspiration.

Let me now discuss our exploration strategy in greater detail, a strategy we call the Vision for Space Exploration, and explain shortly how your community may contribute to the achievement of our aims.

In January 2004, President Bush directed NASA to pursue a bold exploration agenda involving robotic pathfinders and astronaut pioneers that promises to enhance America's scientific, economic and security interests.

The Vision calls on NASA to return humans to the moon within the next decade with a new generation of spacecraft, and prepare the way for pioneering exploration activities on Mars and beyond.

The following video highlights the elements of our Vision for Space Exploration and the work that NASA will conduct to achieve these exploration objectives.

(Show 6-Minute Video)

I think what's most satisfying for people like me who have long wanted our space program to be reaching ever outward, is that the Vision gives NASA and our space exploration partners in many nations a set of long-term goals that are compelling, achievable and responsible.

We will implement our space exploration agenda in achievable and affordable stages, in line with our current budget, which is less than one percent of federal expenditures.

Our next milestone is the second return to flight mission of the Space Shuttle, designated STS-121. This flight will take place once we have solved the problem of foam loss from the Shuttle's External Tank.

Resuming Shuttle flights will result in the continued assembly of the International Space Station, and utilization of this research facility to gain the knowledge necessary for long-term, deep space exploration activities well beyond Earth.

Then, with a new generation of spacecraft we will explore the moon, and learn the skills necessary to conduct human missions to Mars, which in contrast to the moon, will take seven months in transit time to reach instead of three to four days.

In building these new space craft we will be able to use 85 percent of the infrastructure and workforce now dedicated to the Space Shuttle, helping preserve jobs and institutional workforce knowledge while saving time and money.

The spacecraft and systems we will develop will build upon the foundation of proven designs and technologies used in the Apollo and Space Shuttle programs, while having far greater capacity and capability.

They will be able to carry larger and heavier cargos into space and carry more people to the moon than Apollo for longer periods of time. Space will no longer be a destination visited briefly and tentatively. We will learn to live off the land like true pioneers.

We will develop two basic launch vehicles – one for crews and one for heavy cargo, in addition to our lunar landing vehicle. Transporting crew in a separate, smaller vehicle is safer and more efficient than flying crew and cargo together, as the Shuttle does. Fundamentally, the Crew Launch Vehicle will be many times safer than the Shuttle because it will sit on top of its propulsion system and have a launch escape capability.

Our lunar landing design is based on the Apollo program, but the lander this time can carry four astronauts to the surface instead of two. We envision the crew capsule remaining in lunar orbit on autopilot.

The new lunar exploration vehicles will give us the ability to land and conduct exploration activities anywhere on the moon, including on the far side, and in polar regions that may contain large amounts of water ice and other resources the astronauts could use at their base camps. As many of you are aware, the Apollo landers could only go to areas around the lunar equator.

Now where do some of you fit in? Once we are on the moon, we will likely tap the skills of many of the companies represented at this conference to help us set up our lunar base.

And we are definitely in need of your innovative ideas. You can imagine the challenges we will face—setting up habitability modules and power plants, utilizing lunar soil to provide radiation shielding, and mining lunar materials for fuel.

I'm told that one of the challenges your industry faces is to utilize designs that make facilities more operable and maintainable over time.

Well, we're going to face a doozy of a challenge in that regard on the moon, one that I'm certain will help spur your technology development here on Earth.

Today, I can't tell you exactly how we will meet this challenge. I only know we will do so by tapping and challenging the innovative spirit of your community.

In a broader sense, we're confident that our work to implement this Vision will spur technological developments leading to new products and services.

Indeed, just as Project Apollo led to important advances in computing and electronics, the potential spin-off benefits from this bold exploration program could prove considerable.

We anticipate that the overall technology development necessary to implement the Vision will accelerate advances in robotics, autonomous and fault tolerant systems, human-machine interface, materials, life support systems and novel applications of nanotechnology as well as micro devices.

Clearly, many of the technologies that will result from our exploration program may well find great use in the engineering and construction management field and your efforts to innovate engineering packages that have a great re-use potential.

Finally, I'd like to tell you why I'm so excited about NASA's new direction in very personal terms.

(SLIDE 5: FRED GREGORY SHUTTLE MISSIONS)

When my fellow astronauts and I suited up for our Shuttle missions, we knew that we were assuming a degree of risk much greater than one's ordinary commute to work. But we did so willingly because the potential reward was great.

Now that we have learned to live and work in low Earth orbit, it is time to take on greater challenges that will extend our exploration horizons, help us answer profound questions about our place in the Universe and spur tremendous innovation here at home.

These past three years I have gone around the country expressing my heartfelt view that we conduct a space program so grand in its ambitions that my very bright and talented granddaughter Caitlin would obtain the same level of excitement so many of us had in our youth when men landed on the moon.

Thanks to our Vision for Space Exploration, her excitement level knows no bounds.

Yes, our country has huge challenges, some of which were not high on our agenda a few weeks ago. But great nations do not, must not halt when the going gets tough.

We know from history that those nations that are able to sustain a commitment to extend the boundaries of exploration and discovery have a decisive role in shaping the destiny of human civilization.

Our expansion into space is a continuation of the ancient human imperative to explore and to settle new territory when it becomes possible to do so.

I hope that many of you will be involved in the adventures to come when we set out to expand our engineering and construction as well as exploration horizons on the near shores of the space frontier.

And I hope my remarks this morning may have spurred some thought about the potential of innovation in your industry and ours to help pioneer our collective future.

Once again I thank you for your tremendous hospitality and for your interest in what NASA is doing on behalf of the public. Thank you very much.